

BAB VI

PENUTUTP

6.1. Kesimpulan

1. Lama penyimpanan yogurt kolostrum berpengaruh nyata terhadap viabilitas bakteri asam laktat dan tingkat keasaman (pH dan total asam laktat) yogurt kolostrum.
2. Berdasarkan hasil penelitian dapat diketahui nilai total BAL yogurt kolostrum setelah disimpan selama 20 hari turun dari $1,50.10^{10}$ cfu/mL menjadi $2,07.10^8$ cfu/mL.
3. Berdasarkan hasil penelitian dapat diketahui nilai pH yogurt kolostrum turun dari 4,634 menjadi 4,235, total asam laktat yogurt kolostrum meningkat dari 0,72% menjadi 1,10% setelah 20 hari penyimpanan.
4. Selama penyimpanan yogurt kolostrum terjadi penurunan total bakteri asam laktat dan nilai pH, dan peningkatan total asam laktat.

6.2. Saran

Meskipun yogurt kolostrum yang dihasilkan masih memenuhi standar mutu yogurt dari segi keasamana dan jumlah bakteri asam laktat selama 20 hari penyimpanan, namun untuk mengetahui penerimaan konsumen perlu dilakukan uji organoleptik.

DAFTAR PUSTAKA

- Adams, M. R. and M. O. Moss. 2000. *Food Microbiology* 2nd Edition. UK: MPG Books Ltd
- Adolfsson, O., S. N. Meydani and R. M. Russell. 2004. Yogurt and Gut Function. *Am. J. Clin. Nutr.* 80 (2), 245-256
- Ahmadi, M., A. B. Velciov, M. Scurtu, T. Ahmadi dan L. Olariu. 2011. Benefits of Bovine Colostrum in Nutraceutical Products, *Journal of Agroalimentary Processes and Technologies*. 17(1): 42-45
- Alakomi, H. L., M. Skytta and I. M. Melanden. 2000. Lactic Acid Permeabilizes Gram-Negative Bacteria by Disrupting of Outer Membrane. *Applied and Environ. Microbiol*, pp: 2001-2005
- Aldridge, B. M., F. B. Garry dan R. Adams. 1992. Neonatal septicaemia in calves, *JAVMA*. 203(9): 1324 – 1329
- Apriyantono, A., D. Fardiaz, N. L. Puspitasari, Sedarmawati dan S. Budiyo. 1989. *Petunjuk Laboratorium Analisa Pangan*. Bogor: Pusat Antar Universitas Pangan dan Gizi Institut Pertanian Bogor
- Archer, D. L. 2004. Freezing: an under utilized Food Microbiology. *Journal* 90: 127-138
- Arthington, J. 1999. Colostrum Management in newborn calves. *The Florida Cattleman and Livestock Journal*
- Aslam, M; Shahid, M; Rehman, F.U; Naveed, N.H; Batool, A.L; Sharif, S and Asia, A., 2011, Purification and characterization of bacteriosin isolated from *streptococcus thermophilus*, *African Journal*, 5 (18): 2642-2648.
- Badan Standarisasi Nasional. *SNI 2981:2009: Yogurt*. http://sisni.bsn.go.id/index.php?/sni_main/sni/detail_sni/10235. (6 Juni 2014)

- Blum, J. W. and H. Hammon. 2000. Colostrum Effects on The Gastrointestinal Tract, and on Nutritional, Endocrine and Metabolic Parameters in Neonatal Calves, *Livestock Production Science*. 66:151-159
- Buchanan, R. E. and N. E. Gibson. 1974. *Bergeys Manual of Determination Bacteriology 8th edition*. Baltimore: The Williams and Wilkins Company
- Buckle, K. A., R. A. Edwards, G. H. Fleet, and M. Wootton. 1997. *Ilmu Pangan*. Penerjemah: Hari Purnomo dan Adiono. Jakarta: UI Press
- Buckle, K. A., R. A. Edwards, G. H. Fleet, and M. Wootton. 2009. *Ilmu Pangan*. Penerjemah: Hari Purnomo dan Adiono. Jakarta: UI Press
- Carr, J. G., C. V. Cutting, and G. C. Whiting. 1975. *Lactic Acid Bacteria in Beverages and Foods*. London: Academic Press
- Chandan, R. C., C. H. White, A. Kilara, and Y. H. Hui. 2006. *Manufacturing Yogurt and Fermented Milks*. USA: Blackwell Publishing
- Cesarone, M. R., G. Belcaro, A. Di Renzo, M. Dugall, M. Cacchio, I. Ruffini, L. Pellegrini, G. Del Boccio, F. Fano, A. Ledda, A. Bottari, A. Ricci, S. Stuard and Vinciguerra. 2007. Prevention of Influenza Episodes With Colostrum Compared With Vaccination in Healthy and High-Risk Cardiovascular Subjects: The Epidemiologic Study in San Valentino, *Clin Appl Thromb Hem*. 13(2):130-136
- Condon, S. 1987. Responses of Lactic Acid Bacteria to Oxygen. *FEMS Microbiol. Rev*. 46: 269-281
- Connely, O. M. 2001. Antiinflamantory Activities of Lactoferrin (review). *J Am Coll Nut* 20(2): 389S-395S
- Conte, F. dan S. Scarantino. 2013. A Study on The Quality of Bovine Colostrum: Physical, Chemical and Safety Assessment, *Int. Food Research J*. 20(2): 925-931

- Djaafar, T. F. dan E. S. Rahayu. 2006. Karakteristik Yogurt dengan Inokulum *Lactobacillus* yang Diisolasi dari Makanan Fermentasi Tradisional. *Agros*. 8 (1), 73-80
- Early, R., (Ed.). 1998. *The Technology of Dairy Products Second Edition*. UK: Blackie Academic & Professional
- Eckles, C. H., W. B. Combs, and H. Macy. 1980. Milk and Milk Products. 4th Edition Bombay, New Delhi: Tata McGraw Hill Publishing Company Ltd
- Effendi, H. M. S. 2009. *Teknologi Pengolahan dan Pengawetan Pangan*. Bandung: Alfabeta
- Elfstrand, L., H. L. Mansson, M. Paulsson, L. Nyberg and B. Akesson. 2002. Immunoglobulins, growth factors and growth hormone in bovine colostrum and the effects of processing, *Int Dairy J*. 12:879-887
- Erkus, O. 2007. *Isolation, Phenotypic, and Genotypic Caharacterization of Yoghurt Starter Bacteria*. <http://library.iyte.edu.tr/tezler/mastergidamuh/T000641.pdf> (4 Juni 2014)
- Fardiaz, S. 1989. *Mikrobiologi Pangan: Penuntun Praktek Laboratorium*. Bogor: IPB Jurusan Teknologi Pangan dan Gizi
- Fardiaz, Srikandi. 1992. *Mikrobiologi Pengolahan Pangan Lanjut*. Bogor: IPB Press
- Farkey, N. Y. 2002. "Other Enzymes," (dalam *Encyclopedia of Dairy Sciences*, H. Roginski, J. W. Fuquay, P. F. Fox Ed.). Amsterdam: Academic Press, vol. 3, pp. 946–947
- Food Standards Australia New Zealand. 2010. *Yogurt, Natural, Regular Fat (3,5%)*. <http://www.foodstandards.gov.au/consumerinformation/nuttab2010/nuttab2010online searchabledatabase/onlineversion.cfm?&action=getFood&foodID=09C10088>. (6 Juni 2014)
- Fox, P. F. dan A. L. Kelly. 2006. Indigenous enzymes in milk: overview and historical aspects., Part 2. *International Dairy Journal*. 16: 517–532

- Georgiev, I. P. 2008, Differences in chemical composition between cow colostrum and Milk. *Bulgarian journal Of Veterinary Medicine*, 11(1): 3-12
- Green, L., S. Godden, and J. Feirtag. 2003. Effect of batch and high temperature-short time pasteurization on immunoglobulin G concentrations in colostrum (*Abstract*). *J Dairy Sci*. 86(1):246
- Helferich, W. and D. Westhoff. 1980. *All About Yogurt*. New Jersey: Practice Hall Inc
- Heller, K. J. 2001. Probiotic Bacteria in Fermented Foods: Product Characteristics and Starter Organisms. *Am. J. Clin Nutr*. 73: 374S – 379S.
- Herawati, D. A. dan D. A. A. Wibawa. 2011. Pengaruh Konsentrasi Susu Skim Dan Waktu Fermentasi Terhadap Hasil Pembuatan Soyghurt. *Jurnal Ilmiah Teknik Lingkungan* 1(2)
- Hui, Y. H. (Ed.) 1991. *Encyclopedia of Food Science and Technology Vol. 4*. USA: A Wiley-Interscience Publications
- Hui, Y. H. 1992. *Dairy Science and Technology Handbook volume 1: Principles and Properties*. New York: VCH Publishers, Inc
- Hui, Y. H. 1993. *Dairy Science and Technology Handbook Volume 2: Product Manufacturing*. New York: VCH Publishers, Inc
- Hurley, W. L. 2005. *The neonate and colostrums*, ANCSI 308, Department of Animal Sciences, University of Illinois, Urbana-Champaign (http://nutriweb.org.my/publications/mjn00101/mjn_10nl.art1.pdf) (25 Agustus 2014)
- Hoo, H. H. 2014. Pengaruh Perbedaan Konsentrasi Susu Skim Terhadap Viabilitas Bakteri Asam Laktat Yogurt Kolostrum. *Skripsi S-1*. Fakultas Teknologi Pertanian Universitas Katolik Widya Mandala, Surabaya

- Houser, B. A., S. C. Donaldson, S. I. Kehoe, A. J. Heinrichs and B.M. Jayarao. 2008. A Survey of Bacteriological Quality and the Occurrence of *Salmonella* in Raw Bovine Colostrum, *Foodborne Pathogens and Disease*. 5 (6): 853-858
- Jamutz, E. J., L. Melnick and E. A. A. Peerg. 1980. *Microbiologi*. Diterjemahkan oleh Gerard Bonang. Jakarta: Penerbit Buku Kedokteran E. G.C
- Jay, J. M. 1992. *Modern Food Microbiology* 5th edition. New York: Intern Thomson
- Jay, J. M. 2000. Fermentation and Fermented Dairy Products, *Modern Food Microbiology* 6th edition. Singapore: APAC Publishers Services
- Jevon, I. 2014. Pengaruh Penambahan Variasi Konsentrasi Starter Terhadap Viabilitas Bakteri Asam Laktat Yogurt Kolostrum Sapi. *Skripsi S-1*. Fakultas Teknologi Pertanian Universitas Katolik Widya Mandala, Surabaya
- Kanyshkova, T. G., S. E. Rabina, D. V. Semenov, N. Isaeva, A. V. Vlassov, K. N. Neustroev, A. A. Kulminskaya, V. N. Buneva, and G. A. Wevinsky. 2003. Multiple Enzymatic Activities of Human Milk Lactoferrin, *eur j biochem* 270: 3353-3361
- Kehoe, S. I., B. M. Jayara and A. J. Heinrichs. 2007. A survey of bovine colostrum composition and colostrum management practices on Pennsylvania dairy farms, *Journal of Dairy Science*. 90: 4108- 4116
- Korhonen, H., P. Marnila and H. S. Gill. 2009. Bovine milk antibodies for health, *Br J Nutr*. 84:35-46
- Kussendrager, K. D. and A. C. M. Van Hooijdkank. 2000. Lactoperoxidase: physico-chemical properties, occurrence, mechanism of action and applications, *British J. of Nutrition*. 84 (supplement 1): 19-25
- Larson, B. L. 1992. Immunoglobulins of the mammary secretions, (dalam *Advanced Dairy Chemistry. Proteins*, Volume 2, P.F. Fox, ed), Elsevier Applied Science, London. pp. 231–254

- Lazzaro, J. 2000. *Colostrum/Suplementing Colostrum*. wichway@saanedoah.com (5 Juni 2014)
- Limsonwtin, G. 1992. Inhibition of starter cultures, *Aust. J. Dairy Technol.* 47: 100
- Losnedahl, K. J., H. Wang, M. Aslam, S. Zou and W. L. Hurley. 1998. Antimicrobial factor in milk. [terhubung berkala]. <http://www.livestocktrail.uiuc.edu/dairynet/paperDisplay.cfm?ContentID=229> (27 September 2014)
- Mayer, G. 2009. *Immunoglobulin-structureand function*. <http://pathmicro.med.sc.edu/mayer/igstruct2000.htm> (10 Juli 2014)
- McMartin, S., S. Godden, L. Metzqer, J. Feirtaq, R. Bey, J. Stabel, S. Goyal, J. Fetrow, S. Wells and H. C. Jones. 2006. Heat treatment of bovine colostrum. I: effect of temperature on viscosity and immunoglobulin G level, *J Dairy Sci* 89(6):2110-2118
- Meylan, M., M. Rings, W. P. Shulaw, J. J. Kowalski, S. Bech-Nielsen and G. F. Hoffsis. 1995. Survival of *Mycobacterium paratuberculosis* and preservation of immunoglobulin G in bovine colostrum under experimental conditions simulation pasteurization, *Am J Vet Res* 57:1580–1585
- Mitoma, M., T. Oho, Y. Shimazaki, and T. Koga. 2001. Inhibitory Effect of Bovine Milk Lactoferrin an the Interaction Between a Streptococcal Surface Protein Antigen and Human Salivary Agglutinin, *J Bio chem* 276 (21): 18.060-18.065
- Moeljanto, R. D. dan B. T. W. Wiryanta. 2002. *Khasiat dan Manfaat Susu Kambing: Susu Terbaik dari Hewan Ruminansia*. Tangerang: AgroMedia Pustaka
- Ontsouka, C. E., R. M. Bruckmaier and J. W. Blum. 2003. Fractionized milk composition during removal of colostrum and mature milk, *Journal of Dairy Science*. 86: 2005–2011
- Ouwenhand, A. C., B. B. Salvadori, R. Fonden, G. Mogensen, S. Salminem and R. Sellar. 2003. Health Effect of Prebiotics and Culture Containing Dairy Products in Human. *Bulletin of the IDF*. 380: 4-16

- Pakkanen, R. and J. Aalto. 1997. Growth factors and antimicrobial factors of bovine colostrum – review paper. *Int. Dairy J.* 7: 285–297
- Pandey, N. N., A. A. Dar, D. B. Mondal and L. Nagaraja. 2011. Bovine Colostrum: A Veterinary Nutraceutical: a Review. *Journal of Veterinary Medicine and Animal Health*. Vol 3(3), pp, 33-35
- Prescott, L.M., J. P. Harley and O. A. Klein. 2002. Human Diseases Caused by Bacteria, (dalam *Microbiology 5th ed.*). USA: Mc Graw–Hill Publishers
- Rahman, A., S. Fardiaz, W. T. Raharju, Suliantari dan C. C. Nurwitri. 1992. *Teknologi Fermentasi Susu*. Bogor: Depdikbud dan Dirjen Dikti PAU Pangan dan Gizi IPB
- Rice D. N. and D. G. Rogers. 1990. Colostrum quality and absorption in baby calves, NebGuide, File G987, under BEEF, A-41, *Feeding and Nutrition*, Issued May 1990, Publ. by Cooperative Extension, Institute of Agricultural and Natural Resources, University of Nebraska-Lincoln (pubs@unl.edu)
- Robinson, R. K. 2002. Yoghurt, Role of Starter Cultures, (dalam *Encyclopedia of Dairy Science*, H. Roginski, J. Fuquay dan P. Fox, Ed.) Academic Press, United Kingdom, 1059-1063
- Ruckelbusch, Y., L. P. Phaneuf and R. Dunlop. 1991. *Physiology of small and Large Animals*. Philadelphia-Hamilton: B.C. Decker, Inc
- Salazar, J., A. Elizondo, B. M. Jayarao and A. J. Heinrichs. 2010. Effect of heat treatment of bovine colostrum on bacterial counts, viscosity, and immunoglobulin G concentration. *J. Dairy Sci.* 93 :961–967
- Saputra, F. 2008. Perbandingan Komposisi dan Daya Antimikroba antara Susu Sapi Segar (UHT), Kolostrum Sapi Segar dan Kolostrum Sapi Bubuk, *Skripsi S-I*, Universitas Katolik Indonesia Atma Jaya, Fakultas Teknobiologi, Jakarta
- Sarvari, F., A. M. Mortazavian, and M. R. Fazeli. 2014. Biochemical Characteristics and Viability of Probiotic and Yogurt Bacteria in Yogurt during the Fermentation and Refrigerated Storage. *Applied Food Biotechnology*. 1(1): 55-61

- Schanbacher, F. L., R. E. Goodman, and R. S. Talhouk. 1993. Bovine Mammary Lactoferrin: Implications from Messenger Ribonucleic Acid (Mrna) Sequence and Regulation Contrary to Other Milk Proteins, *J Dairy Sci* 76: 3812-3831
- Scimat. 2006. *Lactobacillus delbrueckii subsp. bulgaricus*. http://www.magma.ca/~pavel/science/L_bulgaricus.htm (4 Juni 2014)
- Setiawati, T dan S. Rahayu. 1992. Buku Teknik dan Pengembangan Peternakan seri Penanganan Susu. Direktorat Jenderal Peternakan, Jakarta
- Shah, N. P. and Jellen. 1990. Probiotic Bacteria: Selective Enumeration and Survival in Dairy Foods. *J. Dairy Sci.*, 83: 894-907
- Shrinivas, B., P. Rajesh and S. Manisha. 2010. Colostrum: All in one Medicine, int. *Journal of Pharmacy and Pharmaceutical Sciences*, Vol 2, Suppl 1
- Stabel, J. R., S. Hurd, L. Calvente and R. F. Rosenbusch. 2004. Destruction of *Mycobacterium paratuberculosis*, *salmonella* spp., and *Mycoplasma* spp. in raw milk by a commercial onfarm high-temperature, short-time pasteurizer. *J Dairy Sci.* 87:2177–2183
- Stokes, B. C. and J. F. Bourne. 1989. *Mucosal Immunity-Immunoglobulin in Cow Colostrum*, (dalam *Veterinary Clinica Immunology*, Halliwell, R. E dan Gorman, N. T., Eds.), Philadelphia: WB Saunders Comp, 198-203
- Sunarlim, R. dan S. Usmiatti. 2010. *Kombinasi Beberapa Bakteri Asam Laktat Terhadap Karakteristik Yogurt*. Bogor: Balai Besar Penelitian dan Pengembangan Pascapanen Pertanian, Bogor
- Surajudin, K. R. Fauzi, dan P. Dwi. 2005. *Yoghurt Susu Fermentasi yang Menyehatkan*. Jakarta : Agromedia Pustaka. Hal.3-12
- Surono, I. S. 2004. *Probiotik Susu Fermentasi dan Kesehatan*. Jakarta. Yayasan Pengusaha Makanan dan Minuman Seluruh Indonesia
- Tamime, A. Y. and R. K. Robinson. 1999. *Yogurt Science and Technology second edition*. England: Woodhead Publishing Limited

- Tamime, A. Y. and R. K. Robinson. 2007. *Yoghurt Science and Technology Third Edition*. England: Woodhead Publishing Limited
- Vincu, M. A., T. Ahmadi and J. Ahmadi. 2005. Colostrum As Nutritional Supplement In Sport, *Agroalimentary Processes and Technologies*. 11(1): 33-40
- Walstra, P. and R. Jenness. 1983. *Dairy Chemistry and Physics*. New York: John Wiley and Sons, Inc
- Walstra, P., T. J. Geurts, A. Noomen, A. Jellema and M. A. J. S. Van Boekel. 1999. *Dairy Technology – Principles of Milk Properties and Processes*. New York: Marcel Dekker
- Widodo, W. 2003. *Bioteknologi Fermentasi Susu*. Malang: Pusat Pengembangan Bioteknologi Universitas Muhammadiyah
<http://wahyuwidodo.staff.umm.ac.id/files/2010/01/FERMENTASISUSU.pdf> (6 Juni 2014)
- Widodo, T. T. Taufiq and N. S. Anindita. 2013. Fermented Goat Milk and Cow Milk Produced by Different Starters of Lactic Acid Bacteria: Quality Studies. *Journal of Agricultural Science and Technology*. A(3):904-911
- Winarno, F. G., W.W. Ahnan dan W. Widjajanto. 2003. *Flora Usus dan Yogurt*. Bogor: M-Brio Press
- Winarno, F. G. dan I. E. Fernandez. 2007. *Susu dan Produk Fermentasinya*. Bogor: M-Brio Press
- Wolfson, L. M. and S. S. Sumner. 1993. Antibacterial activity of the laccoperoxidase system: a review, *J. Food Prot.* 56: 887
- Yamaguchi, Y., M. Semmel, L. Stanislawski, A. D. Strosberg dan M. Stanislawski. 1993. Virucidal Effects of Glucose Oxidase and Peroxidase or Their Protein Conjugates on Human Immunodeficiency VirusType 1, *Antimicrobial Agents and Chemotherapy*. 37: 26-31